



# Post-Merger Product Repositioning

Luke Froeb, Director  
Bureau of Economics  
Federal Trade Commission  
and Vanderbilt

Before  
The University of Virginia  
Department of Economics  
November 15, 2004

The views expressed herein are not purported to reflect those of the Federal Trade Commission, nor any of its Commissioners



# Joint Work & Acknowledgements

## ■ Co-authors

- Amit Gandhi, The University of Chicago, PhD student
- Steven Tschantz, Math Dept., Vanderbilt
  - Undergrad class, “Mathematical Models in Economics” (modeling with *Mathematica*.)
  - <http://math.vanderbilt.edu/~tschantz/m267/>

## ■ Acknowledgements

- Greg Werden, U.S. Department of Justice
- Charlotte Manning, FTC
- Janet McDavid, Hogan & Hartson



# Talk Outline

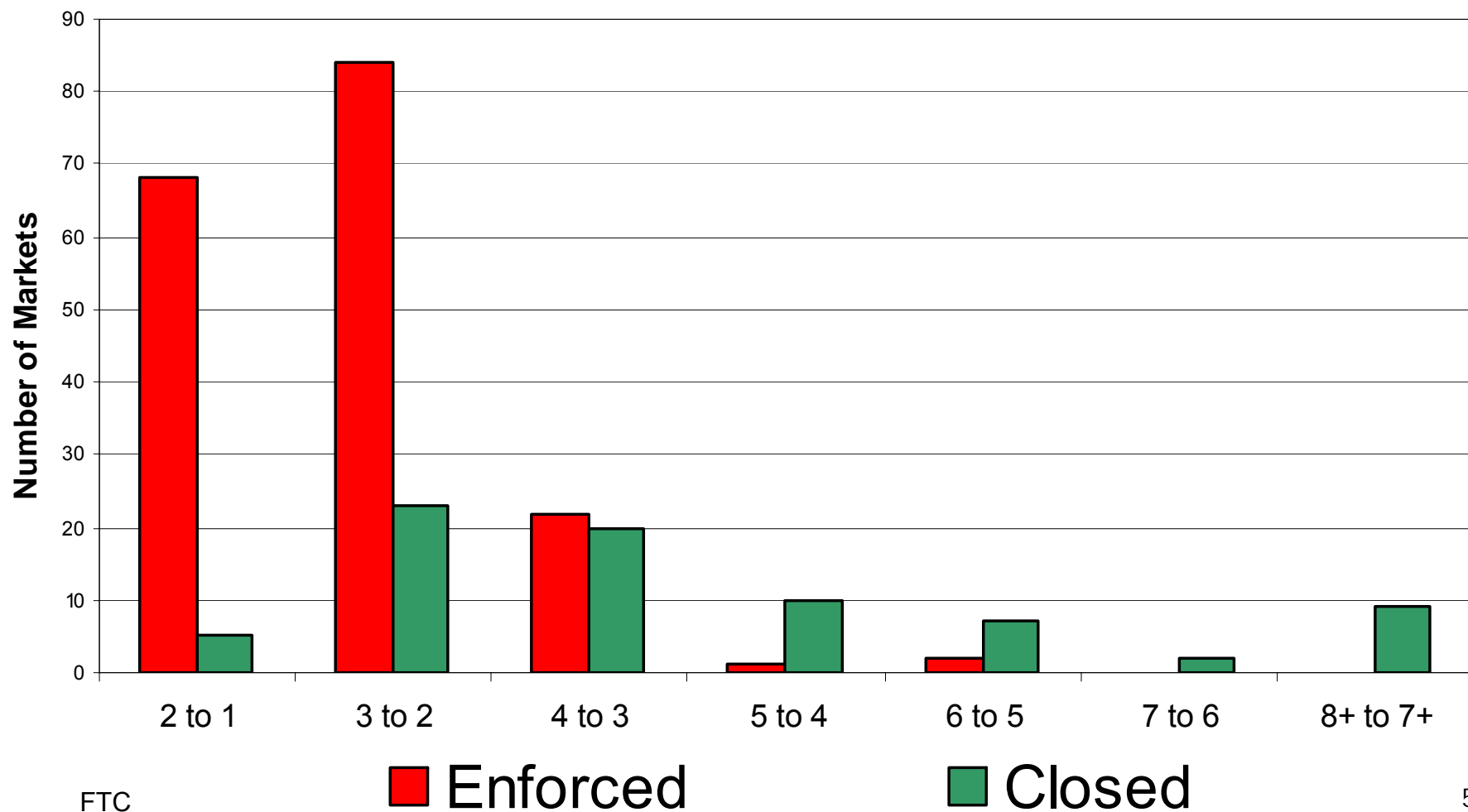
- Policy Motivation
- Lit Review
- Model
- Stochastic response dynamic for computing equilibria
- Computational Experiments
- Conclusions



# Enforcement R&D

- Development of better theories
  - And TESTING them
  - Must be practicable
- Study enforcement actions and non-actions
  - Merger retrospectives
  - Non-merger retrospectives

# FTC Merger Enforcement Data 1996-2003, "Other Industries"





# Merger Retrospective: Marathon/ Ashland Joint Venture

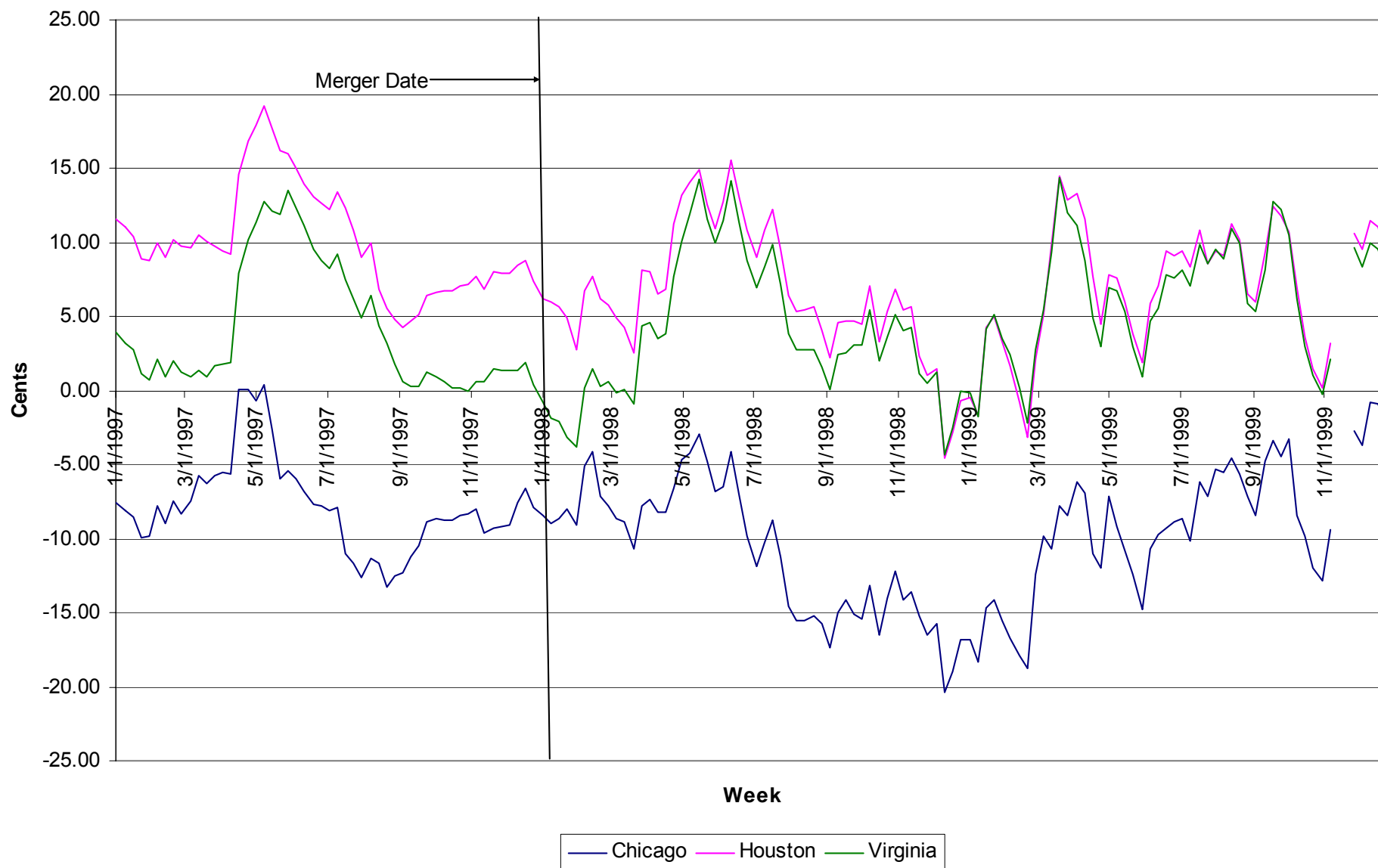
- Combination of marketing and refining assets of two major refiners in Midwest
- First of recent wave of petroleum mergers
  - January 1998
- Not Challenged by Antitrust Agencies
- Change in concentration from combination of assets *less* than subsequent mergers that were modified by FTC



# Merger Retrospective (cont.): Marathon/ Ashland Joint Venture

- Examine pricing in a region with a large change in concentration
  - Change in HHI of about 800, to 2260
- Isolated region
  - uses Reformulated Gas
  - Difficulty of arbitrage makes price effect possible
- Prices did **NOT** increase relative to other regions using similar type of gasoline

## Difference Between Louisville's Retail Price and Control Cities' Retail Price







# Merger Analysis Requires Predictions about Future

- Back-of-the-envelope merger analysis
  - What is motive for merger?
  - Are customers complaining?
  - What will happen to price?
- Price predictions are difficult
  - Natural Experiments
    - Good if nature has been kind enough
  - Model-based analysis
    - Model current competition
    - Predict loss of competition following merger



# Simple Structural Merger Models

- *Assumptions:* Differentiated products, constant MC, Nash in prices.
- *Estimation:*
  - Estimate Demand
  - Recover MC from FOC's →  $MC = MR$
- *Prediction:* Post-merger, MR for the merging firms falls as substitute products steal share from each other
  - Merged firm responds by raising prices
  - Non-merging firms raise price sympathetically
- *Question:* Is the only issue “by how much?”



# Backlash Against Structural Merger Models

- Simplifying Assumptions
  - Static, Price-only competition, MC constant
- Does model give reliable forecasts
  - Out-of-sample predictions?
- Without evidence, “test” model assumptions against observed equilibrium
  - If no evidence to support assumptions, do sensitivity analysis



# Simplifying Assumption: Firms Compete by Setting Price

- Other dimensions of competition?
  - Product, Promotion, Place
- Product repositioning in merger cases
  - Thought to have effect similar to entry
  - Non-merging brands move closer to merging brands
- What if merging brands also move?
  - increased product variety?
  - Softening price competition?



# Economics Literature Review

- Berry and Waldfogel, “Do Mergers Increase Product Variety?”
- Norman and Pepall, “Profitable Mergers in a Cournot Model of Spatial Competition?”
- Anderson et al., “Firm Mobility and Location Equilibrium”
  - simultaneous price-and-location games  
“analytically intractable”



# Finding Equilibria

- Fixed-point algorithms
  - Smooth profit functions
  - Multiple equilibria
- $\{f(X|y), f(Y|x)\} \rightarrow f(X,Y)$  Gibb's sampler
- $\{\pi_1(P_1|p_2), \pi_2(P_2|p_1)\} \rightarrow \pi(P_1,P_2)$
- Every local maxima of  $\pi(P_1,P_2)$  is a Nash equilibrium



# Demand

- Consumers distributed along Hotelling beach
- Indirect utility is function of price + travel cost + random shock

- $v_{ij} = \alpha_i - B(p_i - t * d(x_i, x_j)) + \varepsilon_{ij}$

- Demand is logit

- $q_i(\mathbf{p}, \mathbf{x}) = \int \frac{e^{v_i(p_i, x_i, x)}}{\sum_j^N e^{v_j(p_j, x_j, x)}} dF(x)$



# Supply

- Vendors simultaneously choose price and location

- $profit_i = (p_i - c_i)q_i(\mathbf{p}, \mathbf{x})$

- Nash Equilibrium in two dimensions





# Policy counterfactual:

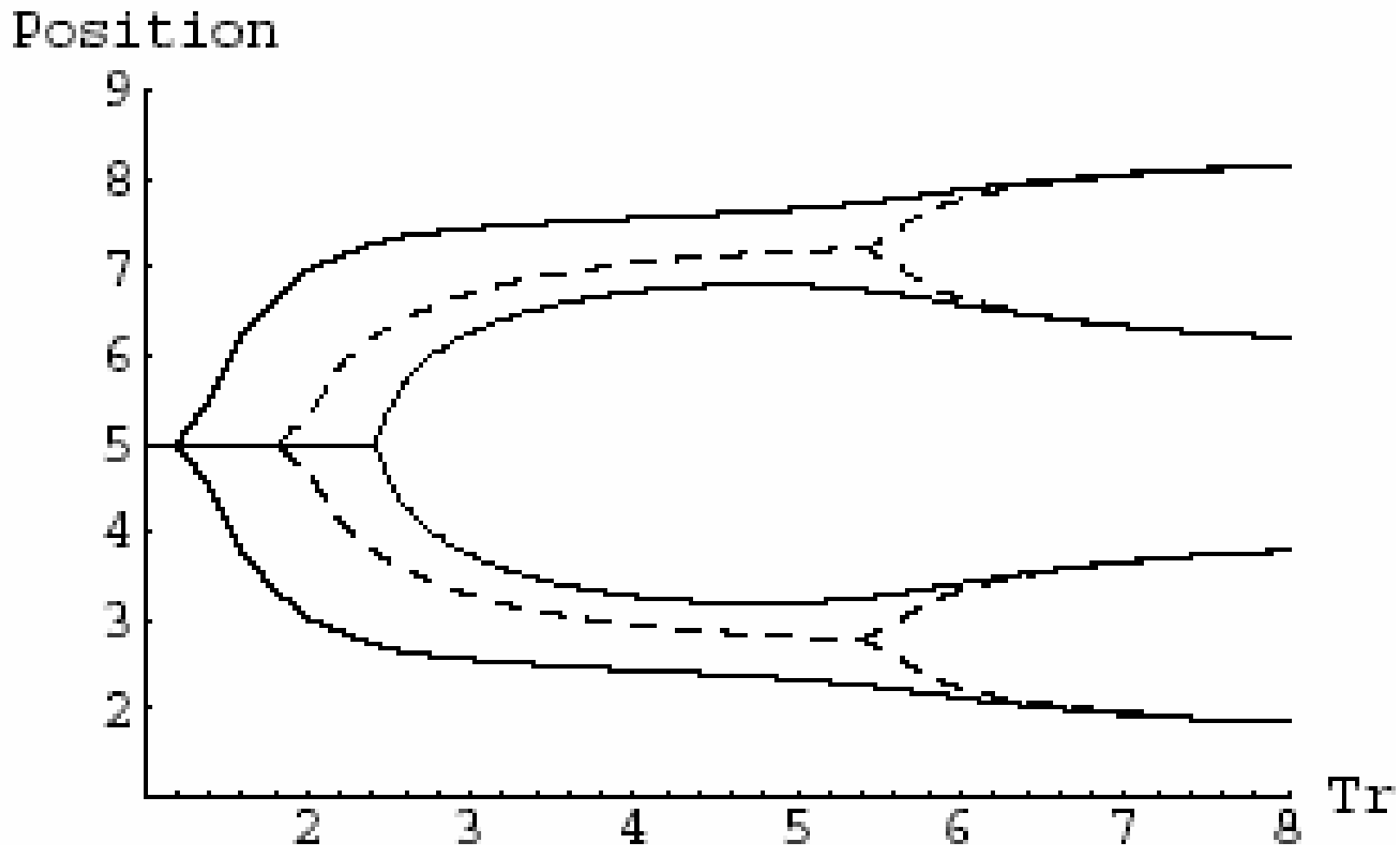
- Post merger, the merging vendors coordinate pricing and location
- Have to compute equilibria to do benefit-cost analysis
  - How else to compute next best alternative?



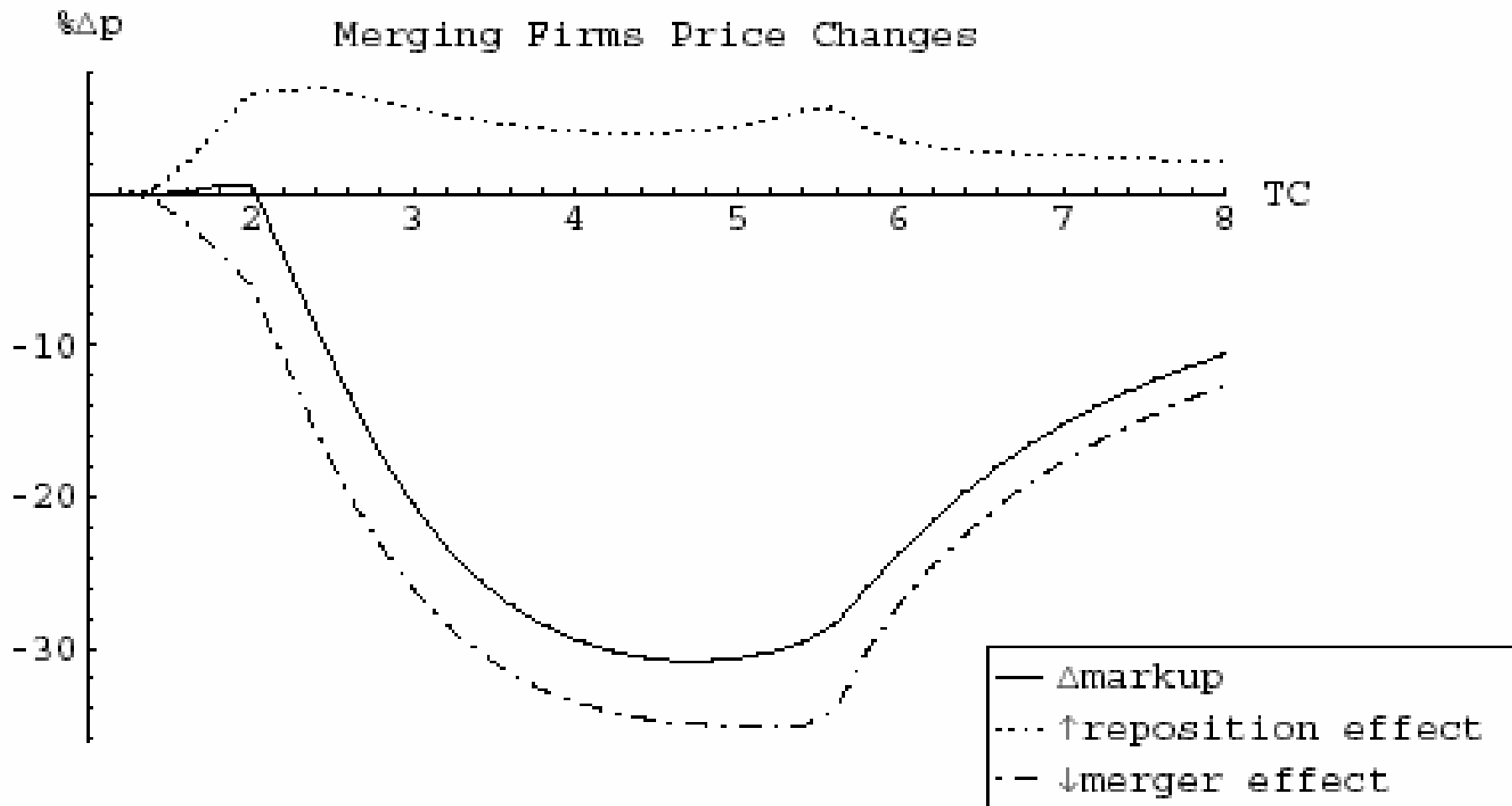
# Merger Decomposition

- **PRE=Pre merger**
- **LOCATION=Pre ownership at post locations**
- **Repositioning effect=LOCATION-PRE**
  - Softens price competition as firms move apart
- **POST=Post merger price and location**
  - Ownership effect=POST-LOCATION
- **Total Effect=POST-PRE**
  - =Ownership+Repositioning

# Pre- (dashed) and Post- (solid) Merger Locations (outside good)

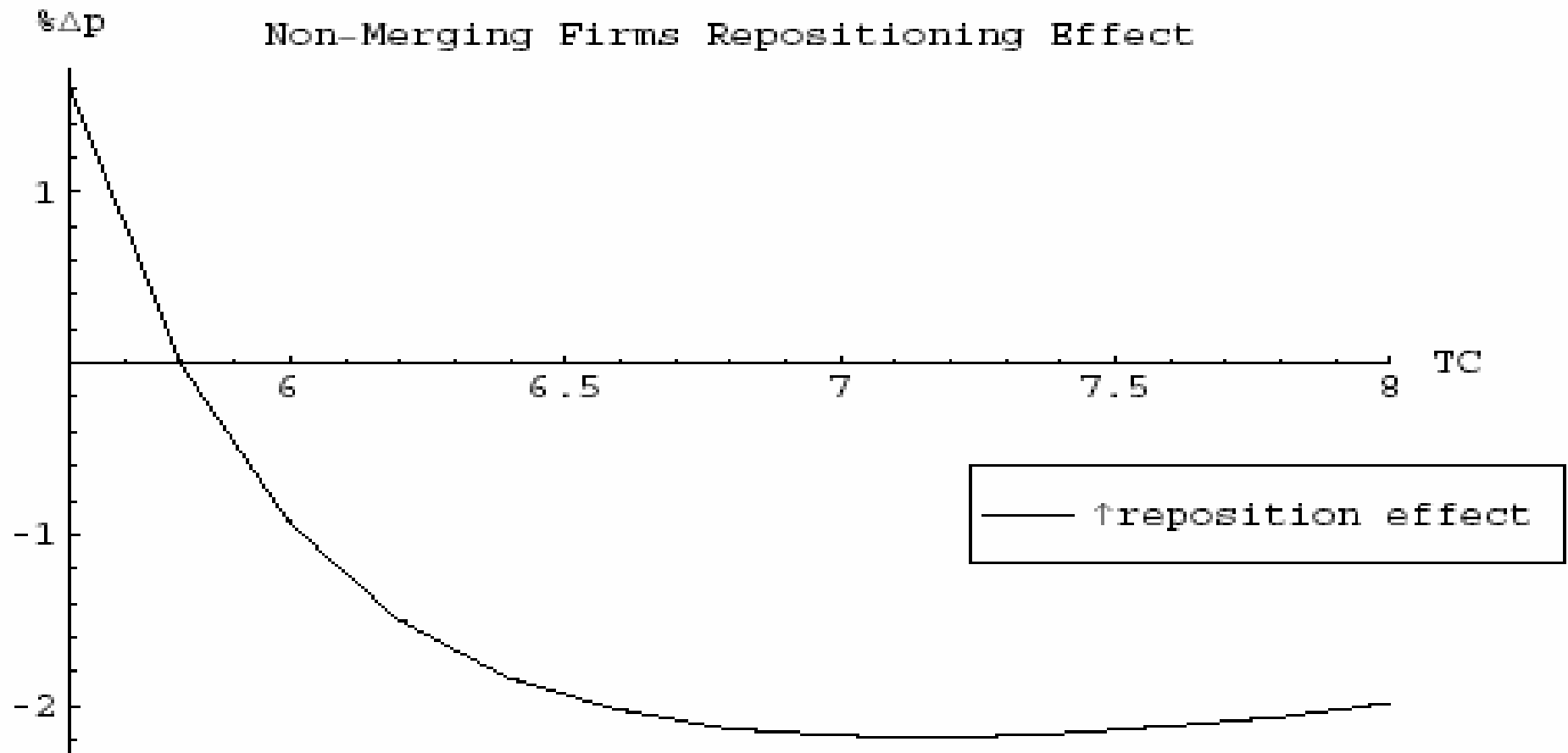


# Pre- and Post-Merger Prices w/ and w/out Repositioning

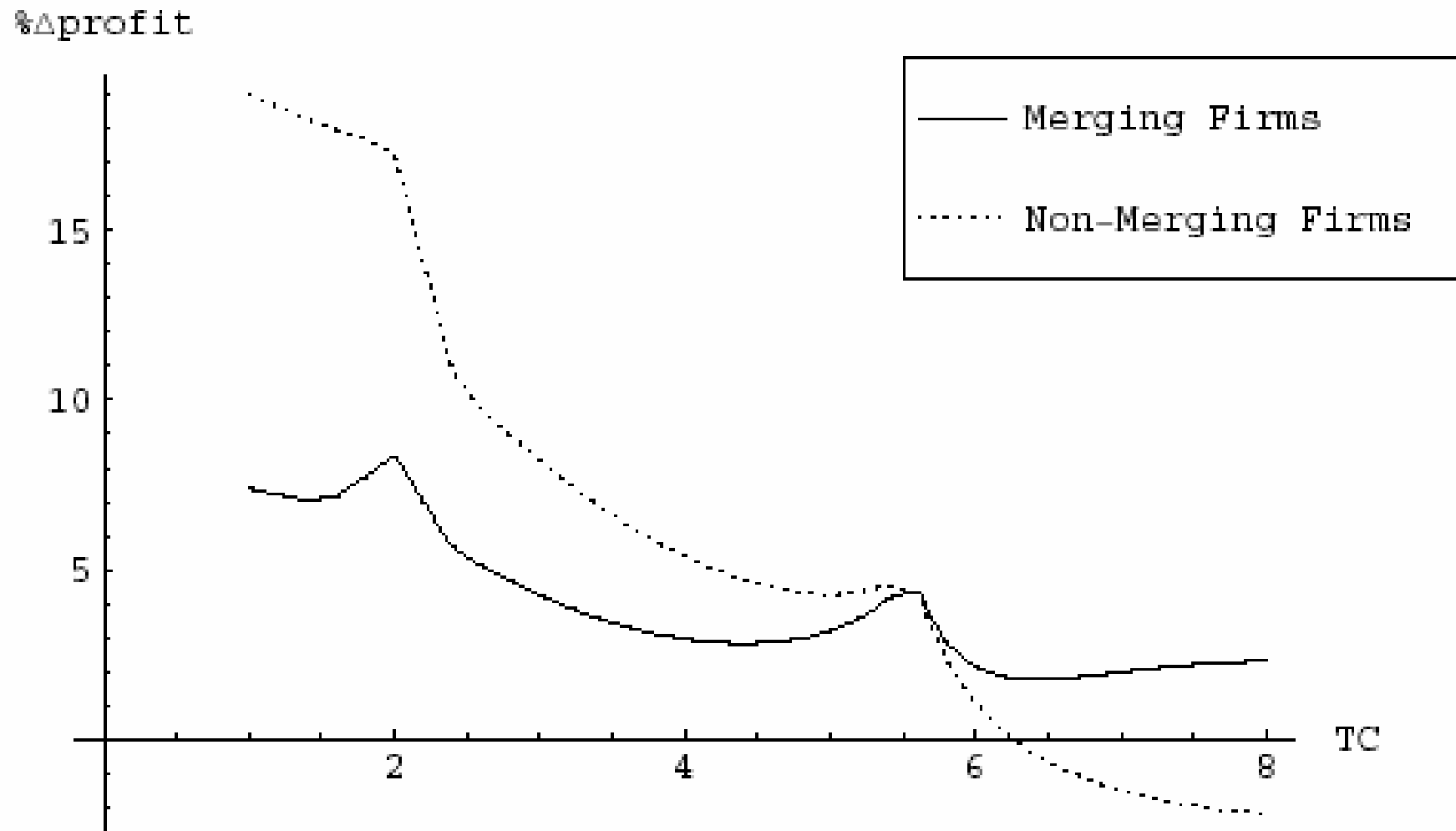




# Non Merging Firms



# Profit Changes





# Simple merger models miss a lot

- Relative to a model with no repositioning
  - Total and consumer welfare may be higher
  - Merging firms raise price
  - Non-merging firms may reduce price
- Taxonomy of effects
  - As products separate, price competition is softened
  - As merged products separate, merger effect is attenuated
  - As non-merging products spread out, less sympathetic price increases.



# What Have We Learned?

- Repositioning by merged firms is more significant than repositioning by non-merging firms
  - Similar to intuition about effect of capacity constraints on merger.
- Pre-merger elasticities change as firms move apart.
  - Is there a way of quantifying effects of repositioning?
- Price can go up or down;
- Consumers can be better or worse off
- Non merging firms can do worse following merger
- New algorithm for finding Nash equilibria
  - Important complement to two-step estimators of games that avoid computing equilibria.